



# The WMO Commission for Climatology Expert Team on Climate Monitoring *including the use of satellite and marine data and products*

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Presented at CLIMAR-III, Gdynia, Poland, 6-9th May 2008

# Overview

- Summary of the ET2.2 Terms of reference and priorities
- Activities and outputs
- Recommendations and issues

# Aim of CCI ET2.2

- Responsible for
  - providing guidance,
  - stimulating and coordinating climate monitoring activities around the world and
  - helping to build related capacities in developing countries

# CCI ET2.2 Terms of Reference (1/2)

- **To review and advise on the development of the WMO annual state of the climate report**
  - and to facilitate coordination of global and regional climate monitoring activities for the benefit of all organizations engaged in this work;
- **To review and contribute to the generation of optimized integrated satellite and *in situ* datasets for marine, terrestrial and atmospheric climate monitoring;**
- **To take actions to assess and improve the interoperability, availability and homogeneity of data** used for global and regional climate monitoring;
- **To coordinate with GCOS and GEOSS as appropriate**, and with the WMO Space/GEO programme on cross-cutting initiatives;
- **To promote and coordinate processing the remotely sensed data**, such as satellite and radar, and archiving them in a format suitable for climate monitoring;
- **To coordinate global, regional and/or national monitoring of climate conditions**
  - and to share data, information and/or data assimilation techniques to integrate remotely-sensed data and *in situ* data that would help improve the monitoring of climate variability and change;
- **To identify the needs and requirements for global and regional long-term reanalysis projects** to ensure they are suitable for monitoring climate variability and change;

# CCI ET2.2 Terms of Reference (2/2)

- To **create guidelines and information on verification** of national and global extremes;
- To **coordinate and manage a global extremes database**, updated annually;
- To **ensure effective collaboration with relevant partners** including the JCOMM Expert Team on Marine Climatology;
- Liaise as required with the teams having similar responsibilities, so as to maximize complementarity and **minimize duplication**;
- To **develop and provide guidelines on the implementation, use and evaluation of satellite data and products in climate monitoring and climate change detection**;
- To establish a **feedback mechanism with satellite data and product producers**, on practical needs and improvements in the use of these data and products in climate monitoring and climate change detection;
- To explore, document and make recommendations for addressing the needs for **capacity building in each region**, pertinent to this topic;



# Priorities for ET2.2

- There are four priorities in the ET2.2's **work plan** for the term of 2006-2009:
  - Applications of satellite & marine data and other in situ datasets
  - Improvements in monitoring of global and continental extremes
  - Stimulation and coordination of phenological practices in climate monitoring activities
  - Capability building in climate monitoring in the developing countries
- So far, **seventeen actions** have been proposed by the ET2.2 members to address the priorities of the work plan.

# Priority activities

- These action items include three major projects:
  - Capability Audit
  - World Wide Climate Monitoring and Climate Watches
  - Global Climate Review

# Capability Audit

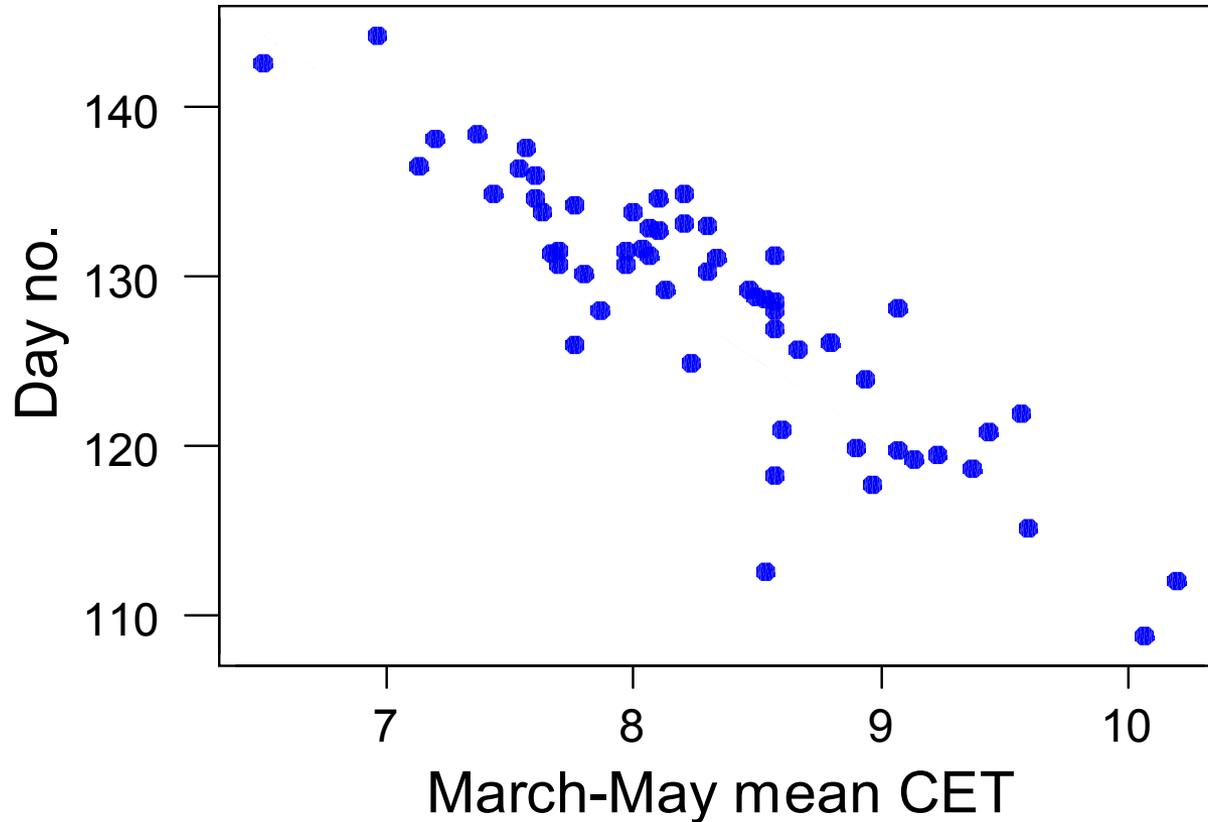
- A web-based "Capability Audit" of satellite and in situ climatologies and related activities will be developed for the ET 2.2 web site. This inventory will list:
  - Datasets descriptions
  - Examples of datasets outputs
  - Links to GCOS CDR requirements
  - Known problems and issues
  - Data access points
  - Appropriate datasets developer/maintainer contact points
  - Summary of "missing" CDR datasets that are yet to be developed under the GCOS requirement
  - Overview of what satellite data are available and appropriate for climate monitoring

# World Wide Climate Monitoring and Climate Watches

- **Promote the capability of the countries around the world in climate monitoring through providing training materials and sharing the operational products**
  - The ET2.2 webpage (<http://www.omm.urv.cat/>) with links to the information on techniques and methodology in climate monitoring,
  - routine monitoring products and the climate watch documents. Overviews and guidelines on some special climate monitoring issues, will be included.
  - Capacity building through demonstration on the web site, monitoring the climate using indices, with links to activities around the world.
  - Review of the CCI guide to phenological practices and update contents, international standardisation (especially reference species) and enhancement of international collaboration.

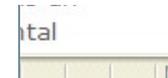


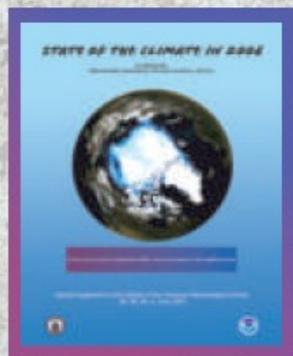
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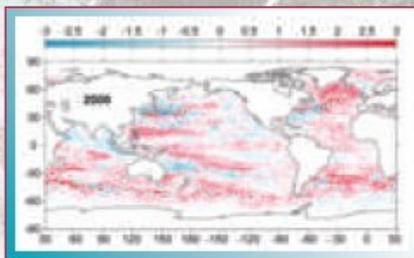
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The 130 page 2006 State of the Climate report, led by NOAA's National Climatic Data Center and produced in a collaborative effort by more than 30 member countries, will be translated into all WMO languages in the

coming months by the ET2.2 team. This report highlights the benefits of member nations working together to monitor and improve the scientific understanding of the global climate. It includes information on current climate conditions and historical changes for more than 20 Essential Climate Variables. These are contained within chapters on global atmospheric conditions, ocean surface and subsurface, tropical cyclone activity in all basins, and conditions in the polar regions. Detailed discussions on notable weather and climate conditions and extreme events within all WMO regions are also included in the report.



Information on ET2.2 activities is available online at <http://www.omm.urv.cat/>



# WMO

Commission  
for  
Climatology

## Team Members

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# Expert Team on Climate Monitoring

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Satellite and Marine  
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# Global Climate Review

## STATE OF THE CLIMATE IN 2006

### Executive Summary\*

A. ARGUEZ, A. M. WAPLE, AND A. M. SANCHEZ-LUGO

The year 2006 was marked by continued global warmth, a severe Antarctic ozone "hole," and further declines in Arctic sea ice.

**O**n the heels of 2005's record-breaking weather events, 2006 was also a year of records. This was especially the case over the polar regions, where the largest Antarctic ozone hole on record occurred in 2006. Sea ice extent in the Antarctic reached records at times for both maximum and minimum extent, and in the Arctic, scientists observed the second smallest sea ice extent on record (behind 2005). These record events came as attention to the polar regions gained greater focus, thanks in large part to the International Polar Year, during which an unprecedented effort is underway to monitor the Arctic and Antarctic from March 2007 through March 2009.

Several countries had their warmest years on record in 2006. These included, but were not limited to, China, the United Kingdom, Spain, and the

Netherlands. Also, parts of Australia reported record warmth, while Canada the United States experienced their second-warmest year on record, behind 1998. There was a transition between La Niña in the first half of the year to a weak to moderate El Niño in the latter half. While some regions had temperature and precipitation anomalies consistent with typical El Niño–Southern Oscillation (ENSO) impacts, it is noteworthy that the record warmth experienced over many parts of the world was not the result of a strong El Niño, as was the case in 1998. Record rainfall over parts of eastern Africa brought widespread damage to the region in 2006, while Australians were "Larried," as some Aussies referred to the destruction left behind by Tropical Cyclone (TC) Larry, including the near decimation of the banana crop.

This June issue of *BAMS* includes a supplemental publication entitled "State of the Climate in 2006." This supplement highlights the most salient weather events and overall climate conditions of 2006, and includes noteworthy weather events (e.g., floods, tropical cyclones, tornadoes, and heat waves), assessments of temperature and precipitation anomalies, and reports on some of the primary features of the global climate system—the Indian monsoon, the Siberian high, the Kuroshio and the Gulf Stream (western boundary currents in the North Pacific and North Atlantic Oceans, respectively), the intertropical convergence zone (ITCZ), and various jet streams, etc. To the extent possible, the conditions in 2006 are

\*For the complete "State of the Climate in 2006," see the supplement to this issue.

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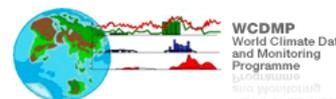
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- Improving the scientific understanding of the state of the global climate through annual **State of the Climate (SC)** reports.
- Published in the June issue of the *Bulletin of the American Meteorological Society*
- Expert Team 2.2 identified **three areas to further improve the report:**
  - (1) **translation** of the English reports into five other languages (Spanish, Chinese, Russian, Arabic, and French)
  - (2) preparation of a short summary to clarify how **authorship** is determined and if additional expertise might be available, and
  - (3) inclusion of **additional phenological information** to the report. Details on each area are provided below.

Technical Commission for Climatology - Open Program Area Group on Monitoring and Analysis of Climate Variability and Change (OPAG 2)  
Expert Team (ET 2.2) on Climate Monitoring including the use of Satellite & Marine Data & Products



# Monitoring the Earth's climate

by Xiaolan L. Wang<sup>1</sup>, Thomas C. Peterson<sup>2</sup>, Jay Lawrimore<sup>3</sup>, Manola Brunet-India<sup>3</sup>, Randall Cerveny<sup>4</sup>, Craig Donlon<sup>5</sup>, Fatima Driouech<sup>6</sup>, Wan A. Wan Hassan<sup>7</sup>, Rainer Hollmann<sup>8</sup>, Mark D. Schwartz<sup>9</sup>, Zuqiang Zhang<sup>10</sup>

## Introduction

**Monitoring changes in the Earth's climate is based on decades and centuries of atmospheric and ocean observations.** Included among these are century-long instrumental measurements of surface temperature and precipitation and records of daily data which are useful in understanding changes in the frequency and severity of extremes such as heavy precipitation events, drought and heat waves.

Observed changes in the Earth's climate have been well documented in numerous national and international studies. In comparison with paleoclimatic data, the average northern hemisphere temperatures during the second half of the 20th century were likely higher than any other 50-year period in at least the past 1 300 years. Global temperatures continued to warm at the start of the 21st century. The strong El Niño of 1997-1998 helped push the global temperature to a

record high. Other observed changes of the past century include an increase in heavy and extreme precipitation events in many parts of the world, rising sea levels, reductions in Arctic sea ice, melting permafrost and an increasing incidence of drought. Projections indicate that these and other trends are likely to continue well into the future and, in some cases, changes are projected to occur at faster rates in the 21st century.

With its Commission for Climatology (CCI), WMO stimulates and coordinates climate-monitoring activities around the world and helps build climate-monitoring capacities in developing countries and Least Developed Countries.

To take up the various challenges in this area, CCI established during its 14th session in November 2005, in Beijing, China, the Expert Team on climate monitoring, including the use of satellite and marine data and products (ET2.2) ([http://www.wmo.int/pages/prog/wcp/ccl/opags/documents/ET2\\_2.pdf](http://www.wmo.int/pages/prog/wcp/ccl/opags/documents/ET2_2.pdf)). It is one of the two Expert Teams under the CCI Open Area Programme Group on Monitoring and Analysis of Climate Variability and Change, which is co-chaired by Thomas C. Peterson (USA) and Manola Brunet-India (Spain). It is responsible for providing guidance, stimulating and coordinating climate-monitoring activities around the world and helping to build related capacities in developing countries.

During its first planning meeting in September 2006 in Tarragona, Spain, the ET2.2 defined a work plan for the period 2006-2009 in which a strong engagement was made in advancing the use of satellite and marine data and products in climate monitoring activities.

## The purpose of monitoring climate and weather events

Earth's climate changes at different time-scales, thus impacting numerous societal, economic and environmental aspects, including safety, health, food security, tourism and energy. The need to cope with, and adapt to, these changes implies the need to understand their causes, magnitudes and extent and to predict their impacts. Climate monitoring provides users with the information they need for effective planning and operations to respond to climate variations in the frequency, intensity and location of extreme weather and climate events. This is particularly true in the case of heat waves, droughts, heavy precipitation, flooding and tropical cyclones (including hurricanes or typhoons), because of their often disastrous impacts on the socio-ecosystem (Figure 1).

For example, droughts can cause reservoir and lake levels to fall

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# Paper published

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6 Direction de la Météorologie Nationale, Morocco  
7 Meteorological Department, Malaysia  
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9 University of Wisconsin-Milwaukee, USA  
10 National Climate Center, China (ET2.2 chair)

# Specific Actions

- **ACTION-2: Craig Donlon, Xiaolan Wang, Rainer Hollmann**
- A Web-based 'Capability Audit' of satellite and in situ climatologies and related activities will be developed for the ET2.2 web site.
- The inventory should list data set descriptions, example data set outputs, links to GCOS CDR requirements, known problems and issues, data access points, appropriate data sets developer/maintainer contact points, and a summary of 'missing' CDR data sets that are yet to be developed under the GCOS requirement.

# Specific Actions

- **ACTION-9: Craig Donlon**
- To develop and submit a presentation to the CLIMAR-III conference managed by the WMO/IOC JCOMM ET on Marine Climatology planned for 2007/8.
- **Craig Donlon** should work with **Scott Woodruff** to develop stronger links between CCI and JCOMM marine climatology activities to ensure these are coordinated.

# Recommendations

- Several presentations at CLIMAR-II have highlighted the need for wider use of satellite data.
  - Recommend that JCOMM/ETMC and CCI 2.2 create a small WG to look at the ‘Capability Audit’ of satellite and marine data and products and other cross cutting issues (DM, user requirements etc)
  - **Craig Donlon** should work with **Scott Woodruff** to develop stronger links between CCI and JCOMM marine climatology activities to ensure these are coordinated.



# Thank you!

